T. A. NELSON.

AIR VALVE FOR RADIATORS.

APPLICATION FILED JUNE 25, 1909.

1,161,877. Patented Nov. 30, 1915.

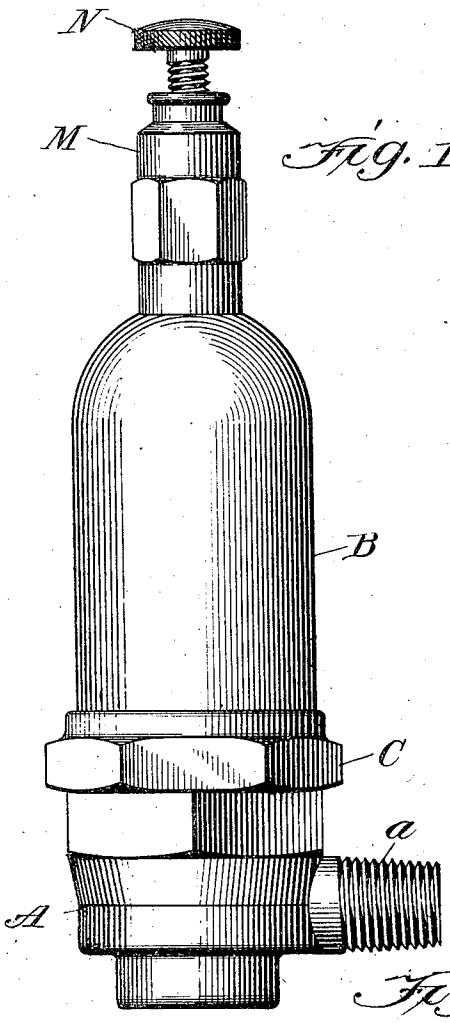

Fig. 1.

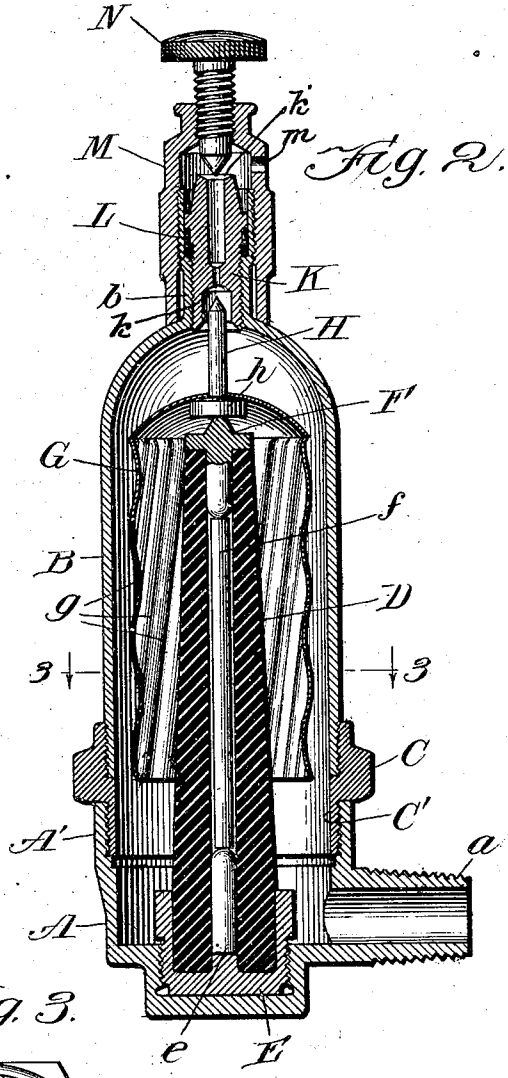

Fig. 2.

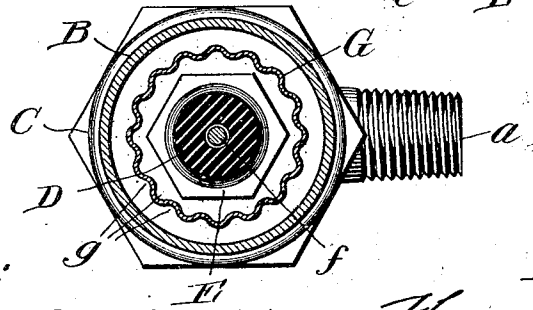

Fig. 3.

Witnesses:

Harry S. Gaither

Henry A. Parks

Inventor:

Thomas A. Nelson

by Sheridan Hickman & Scott

attys

UNITED STATES PATENT OFFICE.

THOMAS A. NELSON, OF CHICAGO, ILLINOIS.

AIR-VALVE FOR RADIATORS.

1,161,877. Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed June 25, 1909. Serial No. 504,368.

To all whom it may concern:

Be it known that I, THOMAS A. NELSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Air-Valves for Radiators, of which the following is a specification.

My invention relates in general to automatic air vent valves for radiators, and more particularly to the type of such valves in which a float and a thermostat are employed.

In valves of the type referred to, the thermostat is detrimentally affected by water and the valve and valve seat become worn by usage, thereby requiring the thermostat, valve, and valve seat to be replaced by new ones, in order that the valves may operate efficiently. An objection to valves of this type, as heretofore constructed, is that the parts which need to be renewed cannot easily be removed from the surrounding casing, and there is also a further objection, in that the joint in the casing necessary to permit its separation to remove the internal parts permits leakage of water.

The primary object of my invention is to provide an improved automatic air valve for radiators in which the thermostat will be protected from injury, as far as possible, and when worn out may be readily replaced.

A further object of my invention is to provide a radiator air valve in which the valve will be automatically rotated relatively to its seat, thereby insuring the smooth and even wear of the valve and valve seat.

A further object of my invention is to provide a radiator air valve, the interior parts of which are easily accessible without the necessity of any joint in the casing below the level of the radiator connection.

A still further object of my invention is to provide an air valve for radiators which will be simple in construction, economical in manufacture, efficient in operation, and durable in use.

My invention will be more fully described herein with reference to the accompanying drawing, in which the same is illustrated as embodied in a convenient and practical form, and in which—

Figure 1 is an elevational view; Fig. 2, a vertical central sectional view; and Fig. 3, a cross section on line 3, 3, Fig. 2.

The same reference characters are used to indicate the same parts in the several figures of the drawing.

Reference letter A indicates the base of an inclosing casing which is provided with an exteriorly screw threaded coupling *a* for engaging a hole in a radiator, so that the radiator will communicate with the interior of the casing.

B indicates the shell of the valve casing, which is provided with a rigid ring C secured around its lower open end in any suitable manner, as by means of engaging screw threads or by brazing or soldering. The ring C is provided with an exteriorly screw threaded lower portion C′ which engages within an interiorly screw threaded circular flange A′ around the base A of the casing.

D indicates a thermostatic post supported within the casing at its lower end by means of a support detachably engaging the base A. This support is shown in the form of an exteriorly screw threaded cup fitting E engaging within an interiorly screw threaded depression in the bottom of the base A. The fitting E is hollow and provided with a central pin *e* which extends within the post D, the latter being, preferably, hollow and tightly engaging at its base within the fitting E. Mounted upon the upper end of the thermostatic post and protecting it from wear is a metallic cap F having a depending pin extending within the opening in the post. Intermediate of the pin *e* of the fitting E and depending pin on the cap F is a rod *f* of a length corresponding to the distance between said pins when the thermostatic post is contracted.

G indicates a float made of any suitable material, such, for instance, as copper, which surrounds the thermostatic post D. Spirally arranged grooves *g* are formed in the outer surface of the float G. The float G carries at its upper closed end a pin valve H which may be conveniently secured to the float by extending through the top wall thereof, the head *h* of the valve lying within the float and adapted to rest upon the flat projection on the cap F when the float is in its lower position.

K indicates a valve plug extending through and adjustable relatively to the shell B of the valve casing. The valve plug may conveniently be exteriorly screw threaded and engaging within an interiorly screw threaded neck *b* upon the shell B. A dis-

charge outlet extends through the valve plug for the venting of air. A valve seat surrounds the outlet *k* with which coöperates the pin valve H. In order to prevent leakage between the valve plug and shell, suitable packing L, such, for instance; as asbestos, is interposed between shoulders on the valve plug and neck *b* of the shell.

An inclosing cap M surrounds the valve plug K and is detachably engaged with an exteriorly screw threaded extension of the neck *b* of the shell B. The cap M has an opening *m* leading to the atmosphere and carries a manually operated valve N which is adapted to be adjusted to open or close a valve seat *k'* provided at the top of the valve plug K.

The manner of using and operation of my improved radiator valve are as follows: The coupling *a* is screwed into a hole in the radiator so that the interior of the radiator communicates with the interior of the valve casing. The parts of the valve are initially in the position shown in Fig. 2. Upon steam being turned on at the radiator, any water which may surge through the radiator into the valve casing will lift the float G and close the valve H against the outlet opening and thereby prevent water passing through the casing. When the surging of the water discontinues, the float falls to the position shown in Fig. 2 and permits the steam to expel the air from the radiator into the casing, and thence to the atmosphere. The engagement between the valve head *h* and metallic cap F serves to retard the rising of the float G until the float is actuated upwardly by a sufficient pressure to break the adherence caused by the water between the valve head *h* and cap F. The float is consequently prevented from fluttering, but is allowed to seat the valve when surging of water occurs. After the air has been expelled and steam enters the valve casing, the thermostatic post D, which is preferably made of vulcanite, expands, thereby raising the float and with it the valve into contact with the valve seat, thereby closing the discharge opening so that the steam cannot escape to the atmosphere. When the steam is cut off from the radiator, the thermostatic post cools and thereby contracts so as to allow the float and valve to fall to the position shown in Fig. 2, the discharge opening being consequently uncovered to permit the discharge of air therethrough when steam is again turned on at the radiator.

When it is not desired to utilize the full heating capacity of the radiator, the screw N is adjusted into engagement with the seat at the top of the valve plug, thereby closing the outlet from the valve casing. Air is consequently prevented from escaping so that it is retained within the radiator loops, thereby preventing the steam from filling the radiator and to such extent decreasing the heating capacity of the radiator.

The relative positions of the valve *h* and its coöperating seat may be accurately adjusted to correspond with the amount of expansion of the thermostatic post, both by means of the fitting E and by means of the valve plug K. The fitting E is made hexagonal around its upper end—as shown in Fig. 3—so that the fitting may be adjusted vertically relatively to the base A, and thereby vary the position of the valve with respect to its seat. The valve plug K may also be adjusted vertically relative to the shell B by removing the cap M and engaging a suitable wrench with the upper end of the valve plug. By these adjustments, injury to the thermostatic post, when expanded, is prevented by obviating the danger of its buckling, which would occur if the valve engaged its seat before the post had expanded to its maximum degree.

The rod *f* within the thermostatic post prevents the latter from being crushed by too great inward adjustment of the valve plug, inasmuch as should the plug be adjusted inwardly until it engages the valve, further adjustment of the valve plug would be prevented by the engagement of the ends of the rod *f* with the pins on the fitting E and cap F.

By providing the spiral grooves *g* in the float G, the movement of the fluids either liquid or gaseous relatively to the float will rotate the latter and thereby change the position of the valve relatively to its seat. The valve and its seat are consequently uniformly worn and a close contact between them insured.

When the deterioration of the thermostatic post or the worn condition of the valve or valve seat renders the valve ineffective, the shell B may be readily disconnected from the base A by applying a wrench to the ring C, and if necessary a holding wrench to the base A. For this purpose, both the ring C and top portion A' of the base are provided with polygonal outer surfaces, as shown in Fig. 1. The ring C is rigid, and thereby prevents any crushing or distortion of the shell B when power is applied to separate the shell from the base.

After the shell has been separated from the base, the float may be lifted from the thermostatic post, and the latter disengaged from the base by disconnecting the fitting E therefrom. A new thermostat may then be readily secured to the base and a new valve provided, or the old valve repaired, after which the float is placed around the thermostat and the shell reëngaged with the base.

From the foregoing description, it will be observed that I have invented an improved air valve for radiators in which the inclosed

parts are readily accessible for purposes of renewal or repair; in which no joint is provided in the inclosing case below the level of the radiator connection, thereby preventing leakage which necessarily occurs when a joint is provided in a valve casing below the radiator inlet; in which the valve and its seat are automatically relatively rotated during operation so as to uniformly and evenly wear these parts; and in which the thermostat is protected from being crushed either through its own expansion or through the adjustment of the coöperating parts.

I claim:

1. In a radiator valve the combination with an inclosing casing adapted to communicate with the radiator and having a discharge outlet, a thermostatic post supported within said casing at one end, a metal cap on the free end of said post, a spirally fluted float surrounding said post and adapted to be aerially rotated, and a valve carried by said float for controlling said discharge outlet, said valve having a head within the float adapted to rest upon said cap when the float is in its lowered position.

2. In an air valve for radiators, the combination with an inclosing casing adapted to communicate with the radiator and having a discharge outlet at its top, of a valve seat around said outlet adjustably supported by said casing, a thermostatic post adjustably supported within said casing at its lower end, said adjustable means comprising an upwardly turned cup adjustably threaded into the base of said casing and adapted to receive the base of said post upon an upwardly extended stud, a valve, a cap upon which said valve is supported having a depending pin inserted in said post, said valve coöperating with said valve seat, and means for preventing the crushing of said post by too great inward adjustment of said valve seat, said means comprising a metal rod embraced within said post between and co-acting with the depending pin of said cap and the stud upon which said post is supported.

3. In a radiator air valve, a hollow screw-jointed casing having an inlet near its base and an outlet near its top, a composite expansion post held at the bottom, a float and a valve cone normally supported pivotally on the upper end of said post, and an air valve seat surrounding said outlet and adapted to coact with the cone, said cone and float being attached together and provided with means integral with the float and comprised by the side walls thereof to cause occasional rotation by reaction from air whenever the same is being exhausted.

4. In a radiator valve, a closed cylindrical casing having a connection with a radiator at its lower end and having an air escape valve at its upper end, a thermostatic post to control said valve, a depending float of inverted cup shape normally pivoted on the upper end of said post, but free to rise within a limited range and to revolve on its axis, a valve cone attached to the upper end of said float so as to engage the escape valve seat when the float rises as under the buoyant influence of water or the thrust of the steam expanded post, the said float having spiral corrugations to react against any moving medium passing longitudinally over its surface thereby causing rotation of said float and valve cone.

In testimony whereof, I have subscribed my name.

THOMAS A. NELSON.

Witnesses:
GEO. L. WILKINSON,
FLORENCE A. FLORELL.